Volunteer Lake Assessment Program Individual Lake Reports

LOON LAKE, PLYMOUTH, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,240	**Max. Depth (m):**	8.8	**Flushing Rate (yr^{1})**	2.6
Surface Area (Ac.):	112	**Mean Depth (m):**	3.9	**P Retention Coef:**	0.55
Shore Length (m):	2,600	**Volume (m^{3}):**	1,784,500	**Elevation (ft):**	489

TROPHIC CLASSIFICATION

Year	Trophic class
1983	MESOTROPHIC
1999	MESOTROPHIC

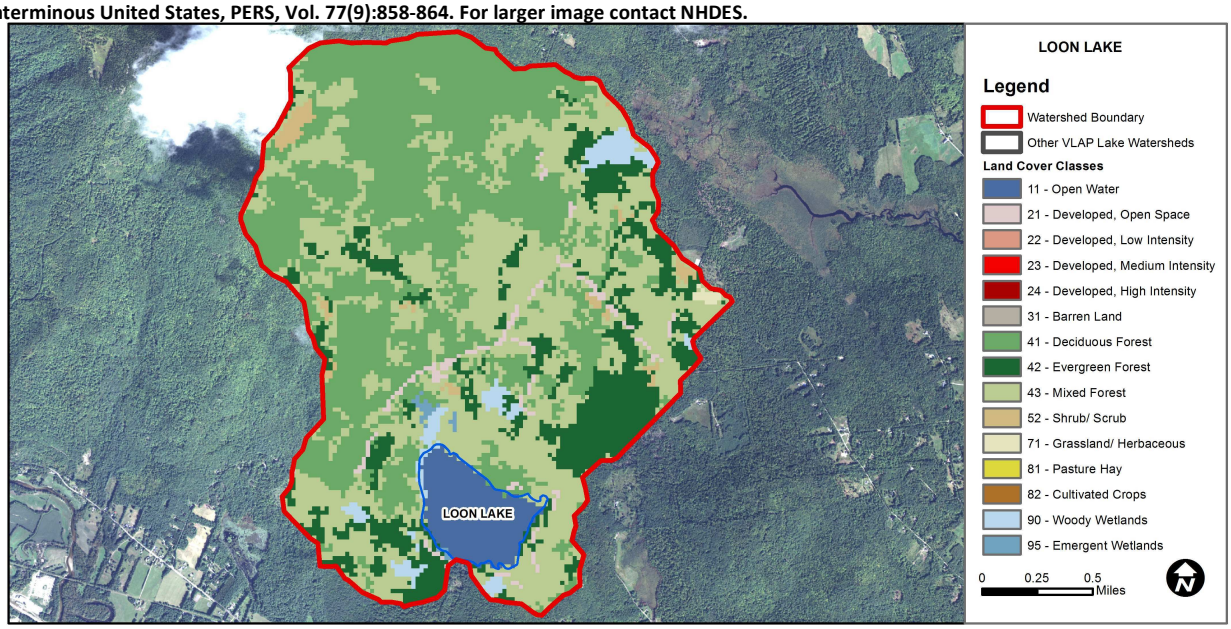
KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Bad	>10%, with a minimum of 2, samples exceed criteria, with 1 or more by a large margin.
	Oxygen, Dissolved	Very Good	There are a total of at least 10 samples with 0 exceedances of criteria.
	Dissolved oxygen satura	Cautionary	There are < 10 samples with 1 exceedance of criteria. More data needed.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	4.62	Barren Land	0	Grassland/Herbaceous	0.17
Developed-Open Space	1.61	Deciduous Forest	39.28	Pasture Hay	0
Developed-Low Intensity	0	Evergreen Forest	13.92	Cultivated Crops	0
Developed-Medium Intensity	0	Mixed Forest	36.44	Woody Wetlands	2.4
Developed-High Intensity	0	Shrub-Scrub	1.26	Emergent Wetlands	0.29

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Loon Lake, Plymouth

2015 Data Summary

Recommended Actions: Lake water quality is generally representative of Mesotrophic, or average water quality, conditions. The improving epilimnetic phosphorus level is a great sign and we hope to see this continue! The fluctuating phosphorus and turbidity in Mill Brook and Gargaz Inlet is likely a result of beaver activity in upstream areas and wetland influences. The dry weather conditions in 2015 likely contributed to the improved water clarity and this highlights the importance of managing stormwater runoff from lake front properties and steep slopes as well as maintaining vegetated buffers along the shoreline. DES' "N.H. Homeowner's Guide to Stormwater Management" and UNH Cooperative Extension's "Landscaping at the Water's Edge" are great resources. Keep up the great work!

Observations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were moderate and stable from July to August. The 2015 average chlorophyll level increased from 2014 and was approximately equal to the state median. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability between years.
- **Conductivity/Chloride:** Deep spot and tributary conductivity and chloride levels were low and less than the state median, except for Gargaz Inlet whose conductivity levels were slightly higher yet remained within an average range for NH lakes. Historical trend analysis indicates stable epilimnetic (upper water layer) phosphorus levels since monitoring began.
- **E. coli:** Mill Brook Inlet and Outlet E. coli levels were very low and much less than the state standards for public beaches (88 cts/100 mL) and surface waters (406 cts/100 mL). Gargaz Inlet E. coli levels were slightly higher yet remained less than the state standard for surface waters and is likely due to wildlife influences.
- **Total Phosphorus:** Epilimnetic and metalimnetic (middle water layer) phosphorus levels remained stable and low in July and August. Average epilimnetic phosphorus remained stable with 2014 and was less than the state median. Historical trend analysis indicates significantly decreasing (improving) epilimnetic phosphorus since monitoring began. We hope to see this continue! Hypolimnetic (lower water layer) phosphorus levels were average in early and late July and elevated in August potentially due to the release of phosphorus from bottom sediments as the summer progresses and dissolved oxygen levels are depleted. Outlet phosphorus levels were stable and low. Gargaz Inlet phosphorus levels were average in July and elevated in August likely due to low flow conditions. Mill Brook Inlet phosphorus levels were average in early July and August and elevated in late July following a significant storm event.
- **Transparency:** Transparency (NVS) was good and increased (improved) from July to August. Average transparency improved from 2014 and was better than the state median. Historical trend analysis indicates relatively stable transparency with moderate variability between years. Transparency measured with the viewscope (VS) was generally much better than NVS transparency and likely a better representation of actual conditions.
- **Turbidity:** Epilimnetic turbidity was slightly elevated in early July when lake levels were high and then decreased to average levels in late July and August. Metalimnetic turbidity was within an average range for that station. Hypolimnetic turbidity was elevated in August potentially due to the accumulation of organic compounds in hypolimnetic waters as the summer progresses and dissolved oxygen levels are depleted. Gargaz Inlet and Outlet turbidity were slightly above average on each sampling event, and Mill Brook Inlet turbidity was elevated in late July following a significant storm event and in August during low flows.
- **pH:** Epilimnetic, Gargaz Inlet and Outlet pH levels were within the desirable range 6.5-8.0 units however metalimnetic, hypolimnetic and Mill Brook Inlet pH levels were less than desirable and slightly acidic. Historical trend analysis indicates highly variable epilimnetic pH since monitoring began.

Table 1. 2015 Average Water Quality Data for LOON LAKE

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	5.6	4.51	3	26.4		9	3.91	4.68	1.32	6.67
Metalimnion				25.8		10			1.52	6.08
Hypolimnion				27.4		17			3.59	5.84
Gargaz Inlet				44.6	135	23			2.36	6.68
Mill Brook Inlet			3	29.3	30	20			3.93	6.29
Outlet In Stream				26.1	10	9			1.40	6.65

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data show low variability.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data highly variable.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Improving	Data significantly decreasing.